

Research Bulletin

How much does it cost the economy when essential services are interrupted?

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While the focus of policies tends to be on improving output or employment of a sector, i.e. policies aimed at positive change, avoiding negative changes can be an important aim of policies too. For example, an unexpected disruption in sectors that supply essential services can impose high costs on the wider economy. Being essential means there are few substitutes for these services, so an outage stops other activities from taking place as planned. Typical examples of such services include water, energy and broadband services, but one might also think of sectors like food distribution, payment systems, emergency services and some transport networks. Unpredictability tends to compound the problem as this limits the options for those affected. If you know the lights are going to go out tomorrow night, you can plan around it, but if your dinner guests have arrived there is less you can do.

The economic effects of these rare but high impact events are less well understood than many other influences on the economy. Because decisions by public bodies and private sector suppliers can affect the risk, scale, duration and geographical footprint of outages, it is useful to explore how costly they may be to the economy and how the cost may vary by geographical areas and user segments. Since suppliers generally do not bear the full economic cost of outages themselves (in economic terms: these events create externalities), there is a role for public policy to help ensure measures are in place to give appropriate weight to wider economic and social interests.

ESRI researchers have recently undertaken a series of studies on the economic costs for Ireland of hypothetical outages in three essential services (electricity, natural gas and fixed line telecoms). The potential costs are indeed high.

The economic cost of telecoms outages was examined in a recent (2013) paper by Lyons, Morgenroth and Tol. A hypothetical outage of the biggest fixed line

* sean.lyons@esri.ie; edgar.morgenroth@esri.ie

telecoms network in the country (Eircom's) was estimated to cost the economy at least €70-80 million per day (€42–50 per household) directly. This is probably a substantial underestimate, because it does not include secondary impacts from disruption of retail payments systems and emergency services or effects on mobile operators that use Eircom's network to link up parts of their networks. Because economic activity and population are concentrated in some parts of the country, even localised interruptions can impose significant costs if they happen in a critical location. The paper found that an outage affecting a single important local exchange could cost the economy up to €1 million per day.

Of course, losing the largest fixed line telecoms network for any length of time is an extreme scenario. Outages in other telecoms networks would likely be less costly for the economy because there is some degree of competition among networks, and many firms and even households use more than one network (e.g. a different fixed line and mobile operator), which might provide some back-up if one went down. Nevertheless, the methods used in this example can be applied to estimate the costs for outages among other networks or services.

In contrast to a single telecoms network, there are very few short-term substitutes for electricity or natural gas, so economic costs from outages in these sectors could be even higher (one can switch fuels or buy a generator, but such changes take time).

Moreover, much of Ireland's electricity is generated in gas-fired power stations. A major gas outage would disrupt the supply of electricity. A 2012 paper by Leahy, Devitt, Lyons and Tol considered this scenario, building on research published in 2011 by Leahy and Tol on the value of lost load in electricity.

Energy disruptions tend to be more costly in the winter than in the summer in Ireland, mainly because of additional demand for heating. Depending upon the time of year and the way the disruption is managed, the economic cost may vary considerably. For example, the estimated daily economic cost for Ireland of a natural gas outage in 2008 ranges from €350 million to €640 million depending upon the season, day of the week and availability of electricity plants on the system. The loss of electricity services due to the gas outage dominates these figures, making up about 80% of the estimated cost. The 2011 paper emphasises that the economic cost of a unit of lost electricity load is likely to be higher for residential customers than for businesses, implying industrial users should be rationed before households.

While these papers considered the sectoral incidence and geographical footprint of outages, and how substitution or complementarity impacts on costs, they did not consider the impact of duration of outages and the scope for backup arrangements. Also, there are other essential services that might benefit from research attention, such as payment systems, water services and transport networks.

In addition to estimating the cost of service interruption, the type of analysis described can contribute to policy in several ways. Facilities that are of critical value to the economy can be identified and prioritised for additional protective measures (e.g. enhanced security, flood prevention, backup arrangements, etc.). Options for mitigating outages in some services, such as natural gas storage, can be evaluated. Linkages among different services can be identified and the risk of cascading failures can be assessed. Methods of managing partial outages can be designed to minimise economic costs, for example by protecting the highest value uses as far as possible. The possible damage from high level operational risks such as industrial relations disputes or corporate insolvency can be estimated and taken into account by policymakers. More generally, to assess the economic value of risk reduction measures one must have a feel for the economic costs of outages.

References

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